

WHAT IS CLAIMED:

1. A system for processing data received in a plurality of incoming streams of variable speeds, comprising:
  - a memory configured to store data;
  - an interface controller comprising a first arbitration element and configured to store the data in the memory using the first arbitration element; and
  - a dispatch unit comprising a second arbitration element and configured to read the data from the memory using the second arbitration element.
2. The system of claim 1, wherein the memory includes:
  - a plurality of memory buckets corresponding to the streams.
3. The system of claim 2, wherein the memory buckets have a fixed size.
4. The system of claim 1, wherein the first arbitration element is configured to store a plurality of entries, each of the entries including a stream number that identifies one of the streams.
5. The system of claim 4, wherein the number of entries in the first arbitration element for a particular one of the streams is based on a speed of the stream.
6. The system of claim 4, wherein the interface controller is configured to:
  - read one of the stream numbers from the first arbitration element,

gather data corresponding to the identified stream, and  
transfer the data to the memory.

7. The system of claim 6, wherein the interface controller is further configured to send a stream identifier with the data transferred to the memory.

8. The system of claim 7, wherein the memory is further configured to sort the data from the interface controller based on the stream identifier.

9. The system of claim 1, wherein the first and second arbitration elements are synchronized.

10. The system of claim 1, wherein the second arbitration element is configured to store a plurality of entries, each of the entries including a stream number that identifies one of the streams.

11. The system of claim 10, wherein the number of entries in the second arbitration element for a particular one of the streams is based on a speed of the stream.

12. The system of claim 10, wherein the dispatch unit is configured to:  
read one of the stream numbers from the second arbitration element,  
read data corresponding to the identified stream from the memory, and  
output the data for processing.

13. The system of claim 1, further comprising:

flow control logic configured to initiate flow control on the storing of data in the memory.

14. The system of claim 13, wherein the flow control includes dropping data from the stream.

15. The system of claim 13, wherein the flow control includes causing the interface controller to stop storing data from the stream in the memory.

16. The system of claim 13, wherein the flow control logic includes:

a buffer configured to temporarily store the data from the interface controller in a plurality of entries,

a counter configured to determine a number of entries in the buffer corresponding to each of the streams, and

a comparator configured to determine whether to initiate the flow control for each of the streams based on the determined number of entries for the stream.

17. The system of claim 16, wherein the comparator is configured to compare the determined number of entries for a stream to a watermark and initiate the flow control for the stream when the determined number of entries exceeds the watermark.

18. The system of claim 17, wherein the comparator is further configured to compare the determined number of entries for the stream to a second watermark and drop data from the stream when the determined number of entries exceeds the second watermark.

19. The system of claim 1, wherein each of the streams has an associated watermark for use in performing flow control on the storing of data in the memory.

20. The system of claim 1, wherein each of the streams has two associated watermarks for use in performing flow control on the storing of data in the memory.

21. A method for processing data received in a plurality of incoming streams of variable speeds, comprising:

storing data from a plurality of variable speed streams in a memory using a first arbitration element; and

reading the data from the memory using a second arbitration element.

22. The method of claim 21, wherein the storing includes:

storing the data in a plurality of memory buckets in the memory based on the streams to which the data belongs.

23. The method of claim 21, further comprising:

writing a plurality of entries into the first arbitration element, each of the entries including a stream number that identifies one of the streams.

24. The method of claim 23, wherein the number of entries in the first

arbitration element for a particular one of the streams is based on a speed of the stream.

25. The method of claim 23, wherein the storing includes:

reading one of the stream numbers from the first arbitration element,

gathering data corresponding to the identified stream, and

transferring the data to the memory.

26. The method of claim 25, wherein the transferring includes:

sending a stream identifier with the data transferred to the memory.

27. The method of claim 26, wherein the storing further includes:

sorting the data based on the stream identifier.

28. The method of claim 21, wherein the first and second arbitration elements

are synchronized.

29. The method of claim 21, further comprising:

writing a plurality of entries into the second arbitration element, each of the entries including a stream number that identifies one of the streams.

30. The method of claim 29, wherein the number of entries in the second

arbitration element for a particular one of the streams is based on a speed of the stream.

31. The method of claim 29, wherein the reading includes:

obtaining one of the stream numbers from the second arbitration element,  
obtaining data corresponding to the identified stream from the memory, and  
outputting the data for processing.

32. The method of claim 21, further comprising:

initiating flow control on the storing of data in the memory.

33. The method of claim 32, wherein the initiating includes:

temporarily storing the data in a plurality of entries in a buffer,  
determining a number of entries in the buffer corresponding to each of the  
streams, and

determining whether to initiate the flow control for each of the streams based on  
the determined number of entries for the stream.

34. The method of claim 33, wherein the determining whether to initiate the flow control includes:

comparing the determined number of entries for a stream to a watermark, and  
initiating the flow control for the stream when the determined number of entries exceeds the watermark.

35. The method of claim 34, wherein the determining whether to initiate the flow control includes:

comparing the determined number of entries for the stream to a second watermark, and  
dropping data from the stream when the determined number of entries exceeds the second watermark.

36. The method of claim 32, wherein the initiating the flow control includes:  
dropping data from the stream.

37. The method of claim 32, wherein the initiating the flow control includes:  
stopping the storing of data from the stream in the memory.

38. The method of claim 21, wherein each of the streams has an associated watermark for use in performing flow control for the associated stream.

39. The method of claim 21, wherein each of the streams has two associated watermarks for use in performing flow control for the associated stream.

40. A system for performing flow control on data in a plurality of incoming streams of variable speeds, comprising:

a buffer configured to temporarily store data from a plurality of streams of variable speeds in a plurality of entries;

a counter configured to determine a number of entries in the buffer corresponding to each of the streams; and

a comparator configured to determine whether to initiate flow control for each of the streams based on the determined number of entries for the stream.

41. The system of claim 40, wherein the comparator is configured to compare the determined number of entries for a stream to a watermark and initiate the flow control for the stream when the determined number of entries exceeds the watermark.

42. The system of claim 41, wherein the flow control includes dropping data from the stream.

43. The system of claim 41, wherein the flow control includes causing a sender of the data to stop outputting data in the stream.



44. The system of claim 41, wherein the comparator is further configured to compare the determined number of entries for the stream to a second watermark and drop data from the stream when the determined number of entries exceeds the second watermark.

45. The system of claim 40, wherein each of the streams has an associated watermark for use in performing flow control on the associated stream.

46. The system of claim 40, wherein each of the streams has two associated watermarks for use in performing flow control on the associated stream.

47. The system of claim 40, further comprising:  
a memory configured to store data from the buffer;  
an interface controller having a first arbitration element and configured to output the data to the buffer using the first arbitration element; and  
a dispatch unit having a second arbitration element and configured to read the data from the memory using the second arbitration element.

48. A method for performing flow control on data in a plurality of incoming streams of variable speeds, comprising:  
storing data from a plurality of streams of variable speeds in a plurality of entries of a buffer;

determining a number of entries in the buffer corresponding to each of the streams; and

determining whether to initiate the flow control for each of the streams based on the determined number of entries for the stream.

49. The method of claim 48, wherein the determining whether to initiate the flow control includes:

comparing the determined number of entries for a stream to a watermark, and  
initiating the flow control for the stream when the determined number of entries exceeds the watermark.

50. The method of claim 49, wherein the initiating the flow control includes:  
dropping data from the stream.

51. The method of claim 49, wherein the initiating the flow control includes:  
causing a sender of the data to stop outputting data in the stream.

52. The method of claim 49, wherein the determining whether to initiate the flow control includes:

comparing the determined number of entries for the stream to a second watermark, and

dropping data from the stream when the determined number of entries exceeds the second watermark.

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53. The method of claim 49, wherein each of the streams has an associated watermark.

54. The method of claim 49, wherein each of the streams has two associated watermarks.

55. A system for performing flow control on data in a plurality of incoming streams of variable speeds, comprising:

a buffer configured to temporarily store data from a plurality of streams of variable speeds in a plurality of entries;

a counter configured to determine a number of entries in the buffer corresponding to each of the streams; and

a comparator configured to:

compare the determined number of entries for a stream to first and second watermarks,

initiate flow control for the stream when the determined number of entries exceeds the first watermark, and

drop data from the stream when the determined number of entries exceeds the second watermark.

56. A network device, comprising:

an input interface configured to:

receive a plurality of packets belonging to a plurality of streams of variable speed, and

output the packets using a first arbitration element;

input logic comprising:

flow control logic configured to initiate flow control on the packets output by the input interface,

a memory configured to store the packets from the input interface,

a dispatch unit configured to read the packets from the memory using a second arbitration element; and

one or more packet processors configured to process the packets from the dispatch unit.

57. A network device, comprising:

means for receiving a plurality of packets belonging to a plurality of streams of variable speed;

means for storing the packets using a first arbitration element;

means for performing flow control on the storing of the packets;

means for reading the packets using a second arbitration element; and

means for processing the packets read using the second arbitration element.